What is claimed is:

1. An optical frequency controlling device for ultra-dense wavelength-division-multiplexed optical channels, the device comprising:

an optical channel unit for outputting a plurality of semiconductor laser beams that form optical channels with different center frequencies;

an optical detection unit for performing optical detection on the plurality of semiconductor laser beams outputted from the optical channel unit and generating beat frequency signals;

a microwave spectrum analyzing unit for outputting the spectral information of the beat frequency signals outputted from the optical detection unit as a digital signal; and

a controller for receiving the output signal from the microwave spectrum analyzing unit and controlling the center frequencies of the optical channels of the optical channel unit.

2. The device as claimed in claim 1, wherein the optical channel unit comprises:

a plurality of optical sub-channel sections for outputting at least one semiconductor laser beam forming an optical channel;

a reference optical sub-channel section for outputting at least one semiconductor laser beam forming a reference optical channel;

an optical switch for receiving the semiconductor laser beams outputted from the plurality of optical sub-channel sections and outputting the semiconductor laser beams of one of the sub-channel sections; and

a first optical coupler for receiving the semiconductor laser beams outputted from the optical switch and the semiconductor laser beams outputted from the reference optical sub-channel section and coupling the semiconductor laser beams outputted from the optical switch and the semiconductor laser beams outputted from the reference optical sub-channel section in one path.

3. The device as claimed in claim 2, wherein the first optical coupler further comprises a first polarization scrambler at one of input terminals thereof for reducing polarization effects.

4. The device as claimed in claim 1, wherein the microwave spectrum analyzing unit comprises a microwave spectrum analysis circuit.

5. The device as claimed in claim 1, wherein the controller receives an output signal of the microwave spectrum analyzing unit, changes the center frequencies of the optical channels of the optical channel unit, finds the beat frequency signal whose frequency is changed and shifts the frequency of the beat frequency signal to a desired frequency, and thereby aligns the center frequencies of the optical channels.

6. An optical frequency controlling device for ultra-dense wavelength-division-multiplexed optical channels, the device comprising:

an optical channel unit for outputting a plurality of semiconductor laser beams that form optical channels with different center frequencies;

an optical spectrum controller for changing optical spectra of the semiconductor laser beams outputted from the channel unit;

an optical detection unit for performing optical detection on the plurality of semiconductor laser beams outputted from the optical channel unit and generating beat frequency signals;

a microwave spectrum analyzing unit for outputting the spectral information of the beat frequency signals outputted from the optical detection unit as a digital signal; and a controller for receiving the output signal from the microwave spectrum analyzing unit and controlling the center frequencies of the optical channels of the optical channel unit and the optical spectrum controller.

7. The device as claimed in claim 6, wherein the optical channel unit comprises:

a plurality of optical sub-channel sections for outputting at least one semiconductor laser beam forming an optical channel;

a reference optical sub-channel section for outputting at least one semiconductor laser beam forming reference optical channels;

an optical switch for receiving the semiconductor laser beams outputted from the plurality of optical sub-channel sections and outputting the semiconductor laser beams of one of the sub-channel sections; and

a first optical coupler for receiving the semiconductor laser beams outputted from the optical switch and the semiconductor laser beams outputted from the reference optical sub-channel section and coupling the semiconductor laser beams outputted from the optical switch and the semiconductor laser beams outputted from the reference optical sub-channel section in one path.

8. The device as claimed in claim 7, wherein the first optical coupler further comprises a first polarization scrambler at one of input terminals thereof for reducing polarization effects.

9. The device as claimed in claim 6, wherein the optical spectrum controller comprises a tunable optical filter.

10. The device as claimed in claim 6, wherein the optical spectrum controller comprises:

a wavelength tunable laser for supplying a wavelength tunable laser light; and

a second optical coupler for coupling an output signal of the wavelength tunable laser with an output signal of the optical channel unit in one optical path.

11. The device as claimed in claim 10, wherein the wavelength tunable laser is obtained by branching the semiconductor laser beams outputted from the optical channel unit to the second optical coupler, amplifying the branched semiconductor laser beams and demultiplexing the amplified semiconductor laser beams.

12. The device as claimed in claim 10, wherein the second optical coupler further comprises a second polarization scrambler at one of input terminals thereof for reducing polarization effects.

13. The device as claimed in claim 6, wherein the optical spectrum controller comprises:

a wavelength tunable laser for supplying a wavelength tunable laser light;

an optical modulator for performing periodic optical modulations on the output signal of the wavelength tunable laser; and

a second optical coupler for coupling the output signal of the wavelength tunable laser with the output signal of the optical channel unit in one optical path.

14. The device as claimed in claim 13, wherein the wavelength tunable laser is obtained by branching the semiconductor laser beams outputted from the optical channel unit to the second optical coupler, amplifying the branched semiconductor laser beams and demultiplexing the amplified semiconductor laser beams.

15. The device as claimed in claim 13, wherein the second optical coupler

further comprises a second polarization scrambler at one of input terminals thereof for reducing polarization effects.

16. The device as claimed in claim 6, wherein the microwave spectrum analyzing unit comprises a microwave spectrum analysis circuit.

17. The device as claimed in claim 6, wherein the controller controls the optical spectrum controller, receives an output signal of the microwave spectrum analyzing unit, changes center frequencies of the optical channels of the optical channel unit, finds the beat frequency signal whose frequency is changed and shifts the frequency of the beat frequency signal to a desired frequency, and thereby aligns the center frequencies of the optical channels.

18. A bi-directional optical communication system in which an optical frequency controlling device for ultra-dense wavelength-division-multiplexed optical channels as claimed in claim 1 is utilized.

19. A bi-directional optical communication system in which an optical frequency controlling device for ultra-dense wavelength-division-multiplexed optical channels as claimed in claim 6 is utilized.

20. An optical spectrum analyzer in which an optical frequency controlling device for ultra-dense wavelength-division-multiplexed optical channels as claimed in claim 1 is utilized to calculate the optical spectrum.

21. An optical spectrum analyzer in which an optical frequency controlling device for ultra-dense wavelength-division-multiplexed optical channels as claimed in

claim 6 is utilized to calculate the optical spectrum.